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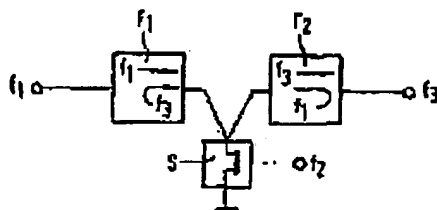
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(54) FREQUENCY CONVERTER

(57)Abstract:

PURPOSE: To increase the intermodulation intensity of a device, which modulates input signals of a frequency f_1 into signals of an intermediate frequency f_3 by using an oscillator signal of a frequency f_2 , and at the same time, to reduce the power consumption of the device.

CONSTITUTION: A switching element S is connected to a high resistance and a low resistance by means of the control source of an oscillator frequency f_2 , in parallel with a signal-guiding path and a circuit F_1 having a characteristic so as to pass a frequency f_1 and blocks another frequency f_3 is installed to the signal-supplying path of the signal-guiding path and a circuit F_2 having characteristic such that it passes the frequency f_3 and blocks the frequency f_1 is installed to the signal sending-out path of the signal-guiding path. Therefore, an extremely large intermodulation intensity is obtained.



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06-204751 DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is a frequency f_1 . It is a frequency f_2 about an input signal. An oscillator signal is used and it is the intermediate frequency signal f_3 . It is related with the power converter to change.

[0002]

[Description of the Prior Art] In this kind of power converter, generally, through the circuit which has non-linear characteristics using an oscillator signal, an input signal is controlled so that a desired intermediate frequency signal is especially acquired as a mixed result.

[0003]

[Problem(s) to be Solved by the Invention] The technical problem of this invention has intermodulation reinforcement in offering the power converter of the class high moreover stated at the beginning with low power consumption.

[0004]

[Means for Solving the Problem] According to [in order to solve an above-mentioned technical problem] this invention, a switching device is the oscillator frequency f_2 to juxtaposition in a signal guidance way. The source of control connects with high resistance and low resistance. In the signal supply way of a signal guidance way, it is a frequency f_1 . It is made to pass and is a frequency f_3 . The circuit which has the property to prevent is arranged and it is a frequency f_3 in the signal sending-out way of a signal guidance way. It is made to pass and is a frequency f_1 . The circuit which has the property to prevent is arranged.

[0005] The advantageous configuration of this invention is indicated after claim 2.

[0006]

[Effect] Especially the advantage acquired by this invention is in the point that the very big intermodulation reinforcement of the whole equipment is obtained. The input signal terminal and the intermediate frequency signal terminal are unsymmetrical at low resistance (50ohm-100ohm). Other advantages are points that the power consumption of equipment is low, as it is called 300mW. about 2.5 [furthermore,] -- the big driver voltage range which V-7V can permit is obtained, and the big L.O. (Local Oscillator= local oscillator) level range which can moreover be permitted for the optimal drive is obtained. Another advantage is a point, i.e., the point which vibration does not produce, that the high stability of equipment is acquired. Mixed loss is suitable for a passive type switch mixing stage at few points. Equipment has mixed, very high effectiveness. The mixed principle is applicable to the frequency from the low frequency range to the high GHz range. A mixer is a low noise. a mixer -- an input edge and/or an outgoing end -- amplifier and transmission impedance amplifier -- satisfactory -- moreover -- reaction -- it is connectable few.

[0007]

[Example] Next, one example of this invention is explained to a detail based on a drawing.

[0008] The function of the mixer of a power converter is shown in drawing 1 . It sets to this drawing 1 and is an input signal f_1 , i.e., a frequency. It is a frequency f_2 to the supplied valid signal. An oscillator signal is mixed and desired frequency $f_3 = |f_1 + f_2|$ or $f_3 = |f_1 - f_2|$ called an intermediate frequency is generated. A frequency may be a frequency band. To juxtaposition, switching device S (a field-effect transistor, however diode, etc. may be especially used) is the oscillator frequency f_2 in a signal guidance way. The source of control connects with high resistance and low resistance. Frequency-selective circuit F1 which has the following properties, respectively in the signal feed zone and the signal sending-out section of a signal guidance way And F2 It is arranged. That is, it sets on a signal supply way and is a frequency f_1 . It is made to pass and is a frequency f_3 . It prevents, it sets on a signal sending-out way, and is a frequency f_3 . It is made to pass and is a frequency f_1 . It has the property to prevent.

The frequency complement circuit F1 formed as a filter so that the purpose might be suited, and F2 Frequency inhibition which can be set is performed by reflecting in the direction over switching device S by high resistance, and is shown to drawing 1 by the reversal arrow head. [0009] The whole power converter circuit shown in drawing 2 contains a mixer, control form L.O. drive amplifier, and an intermediate frequency amplifier, and especially these are accumulated by the monolithic into the semi-conductor substrate. The circuit is designed in order to carry out frequency conversion of about 1.2GHz RF signal RF by intermodulation on-the-strength $dIM > 60dBc$ by mixed amplification factor $G > 10db$, mixed noise $F(SSB) < 8db$, and $P_{in} = 2 \times (-15) dBm$, IF, i.e., an intermediate frequency condition, 200MHz or less. The supplied L.O. level is $-10dBm - +13dBm$, as a function is not blocked remarkably in the case of this circuit (200 times). In the case of the supply voltage of $UB = 5V$, power consumption is about 300mW. Driver voltage UB In the case of this circuit, it can change in [big] 2.5V-7V. Intermodulation spacing which can attain this mixer improves 100 to 1000 times rather than the case of a MMIC mixer conventionally well-known [for consumption form electronic products].

[0010] The mixer consists of a passive type (it operates without drive current) mixer transistor Q2, and a frequency filter. A high-pass filter C3 is arranged on RF way as a signal supply way, and an inductance L1 and KONDESA C4 are arranged, the signal sending-out way, i.e., IF way, as a band-elimination filter. Diode D1 protects the gate of a field-effect transistor (mixer transistor Q2) from the very large current density to a flow direction.

[0011] L.O. The drive amplifier consists of transistors Q1 which have attained the high amplification factor of large inclination with big gate width. The amplified L.O. signal controls the gate of the mixer transistor Q2 through a capacitor C2 (switch drive).

[0012] Total of the capacitive load in the drain of a transistor Q2 is compensated with the external inductance L in consideration of the inductance of a case terminal. The capacitor C1 connectable with Ground M at arbitration is used in order to make the external inductance L small.

[0013] On the other hand, the limit and control circuit which consists of diodes D2, D3, and D4 and resistance R2 and R1 restrict the L.O. signal amplified by the transistor Q1. That is, the negative electrical potential difference which this produced in resistance R2 controls the gate of a transistor Q1 through resistance R1, and the gate of the mixer transistor Q2 drives the optimal over the large L.O. level range, and the current consumption of the whole circuit becomes min to coincidence.

[0014] IF, i.e., an intermediate frequency amplifier, consists of transistors Q3 in which resistance negative feedback association was carried out by resistance R3, in order to maintain an input edge and an outgoing end at low resistance (75ohm-100ohm). The accumulation form DC individual capacitor C5 can be expanded by the external capacitor of arbitration, and can extend the low resistance input edge of IF amplifier to low frequency by this.

CLAIMS

[Claim(s)]

[Claim 1] Frequency f1 It is a frequency f2 about an input signal. An oscillator signal is used and it is the intermediate frequency signal f3. In the power converter to change To juxtaposition, a switching device (S) is the oscillator frequency f2 in a signal guidance way. The source of control connects with high resistance and low resistance. In the signal supply way of a signal guidance way, it is a frequency f1. It is made to pass and is a frequency f3. The circuit (F1) which has the property to prevent is arranged. In the signal sending-out way of a signal guidance way, it is a frequency f3. It is made to pass and is a frequency f1. Power converter characterized by arranging the circuit (F2) which has the property to prevent.

[Claim 2] In a signal supply way, it is a frequency f_1 . It is made to pass and is a frequency f_3 . Reflect and the filter (F1) to prevent is prepared. In a signal sending-out way, it is a frequency f_3 . It is made to pass and is a frequency f_1 . Reflect and another filter (F2) to prevent is prepared. Among both filters (F1;F2), it is the frequency f_2 of an oscillator. Power converter according to claim 1 characterized by arranging the switching device (S) switched to high resistance and low resistance, and connecting with a ground.

[Claim 3] A switching device (S) is a power converter according to claim 1 or 2 characterized by being a field-effect transistor.

[Claim 4] Claim 1 characterized by including a mixer, control form local-oscillator drive amplifier, and an intermediate frequency amplifier thru/or the power converter of one publication of three.

[Claim 5] A mixer is claim 1 characterized by consisting of a passive type mixer transistor (Q2) and a frequency filter (F1;F2) thru/or the power converter of one publication of four.

[Claim 6] For the frequency filter (F1) arranged on the signal supply way, the frequency filter (F2) which is a high-pass filter (C3) and has been arranged on the signal sending-out way is a frequency f_1 . Power converter according to claim 5 characterized by being the band-elimination filter (L1, C4) of **.

[Claim 7] A local-oscillator drive amplifier is claim 1 characterized by consisting of transistors (Q1) and connecting with a limit and a control circuit thru/or the power converter of one publication of four.

[Claim 8] An intermediate frequency amplifier is claim 1 characterized by consisting of transistors (Q3) by which resistance negative feedback association was carried out thru/or the power converter of one publication of four.

[Claim 9] Claim 1 characterized by at least the part being accumulated by the monolithic on a semi-conductor substrate thru/or the power converter of one publication of eight.